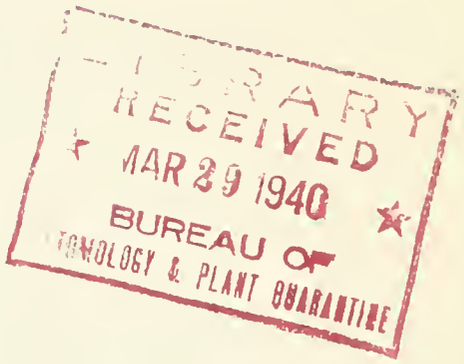
THE INSECT PEST SURVEY BULLETIN



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BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
UNITED STATES
DEPARTMENT OF AGRICULTURE
AND
THE STATE ENTOMOLOGICAL
AGENCIES COOPERATING

INSECT PEST SURVEY BULLETIN

Vol. 19 Summary for 1939 No. 10

INTRODUCTION

The weather of 1939 followed the general trend of abnormal warmth for the last several years. The winter of 1938-39 was unusually warm over the entire country, very dry in the fall, but there was abundant rainfall during the winter so that spring started with plenty of soil moisture.

The spring months were warm and dry except in the northeastern quarter of the United States, where unusually cool, wet weather prevailed.

In June and July the temperature generally was near normal. Rainfall was varied, being abundant in Ohio Valley and the Southern Atlantic States. Much of the West, the Plains States, and the Northeastern States were deficient in rainfall.

August was very hot over the entire country and very dry, except on the west coast and in the Southeastern States.

September also brought abnormally high temperatures and widespread deficiencies in precipitation. A severe and widespread drought developed throughout the Great Plains and the central valley. The abnormally warm dry weather continued into October, rain being scanty except in the northeastern part of the country.

The weather was favorable for grasshoppers, as it was rather warm and dry at the time of hatching. It also facilitated development of the young hoppers, and allowed rapid movement into cultivated crops.

The spring was cool and wet in much of the chinch bug belt, proving unfavorable to the development of the insect. On the other hand the warm, dry weather in the fall favored development of the insect, allowing more nymphs to mature and, consequently, a heavy population went into hibernation.

The warm dry fall had an indirect effect on the hessian fly, the wheat sown prior to fly-free dates being slow in germinating because of the lack of soil moisture.

GRASSHOPPERS

Severe infestations occurred in all states west of the Mississippi River, especially in the northern Great Plains States. At the time when grasshopper eggs were hatching, these insects were favored by the warm, dry weather which prevailed over most of infested area. In the South hatching started the latter half of April and continued without interruption so that by the end of May Melanoplus mexicanus Sauss. and M. bivittatus Say were entirely through hatching except in isolated districts. M. differentialis was later in developing. By

this time the range grasshopper (Dissosteira longipennis Thos.) in northeastern New Mexico, southeastern Colorado, western Kansas, and the Panhandles of Oklahoma and Texas had completed a 100-percent hatch, except in the higher altitudes. The young hoppers developed rapidly and, in spite of control operations, moved into cultivated crops.

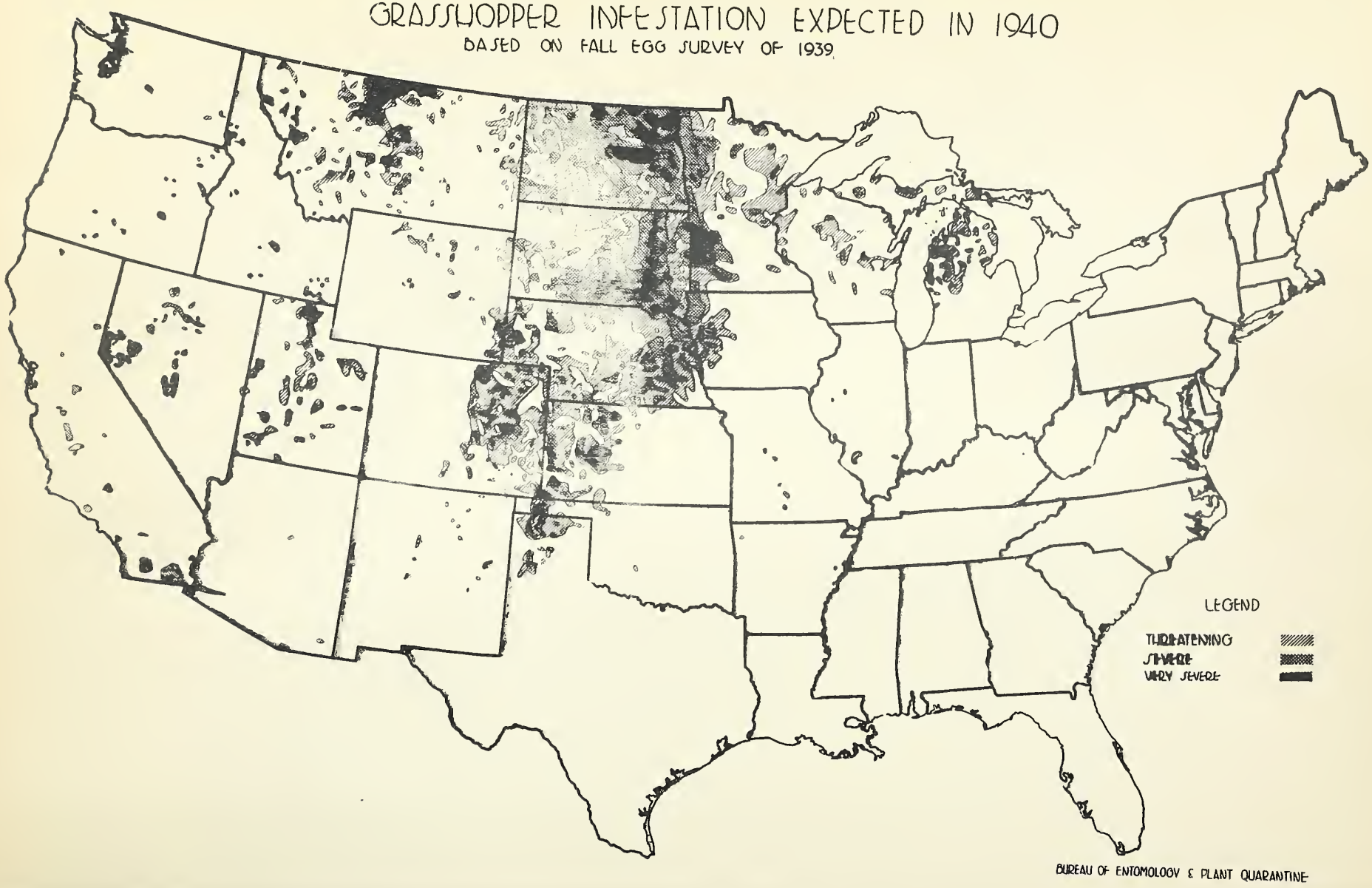
Prolonged cold rainy weather in late May and early June in the Northern Great Plains delayed growth of the nymphs, interfered with control operations and considerably reduced infestations in the eastern part of the infested area. Adults were maturing generally by the last of June. Small local flights occurred in Nebraska and Kansas. More extensive flights occurred in eastern Montana, where all green vegetation was devoured. About 25,000,000 acres was baited, and although the average percentage of damage to crops was small, crops in some fields were completely destroyed. D. longipennis was so successfully controlled, that it is believed that with 1 more year of intensive baiting the outbreak will be practically eliminated. The egg survey carried on in the fall showed a marked decrease in the extent and severity of the infestations. A map based on the survey is appended.

CHINCH BUG

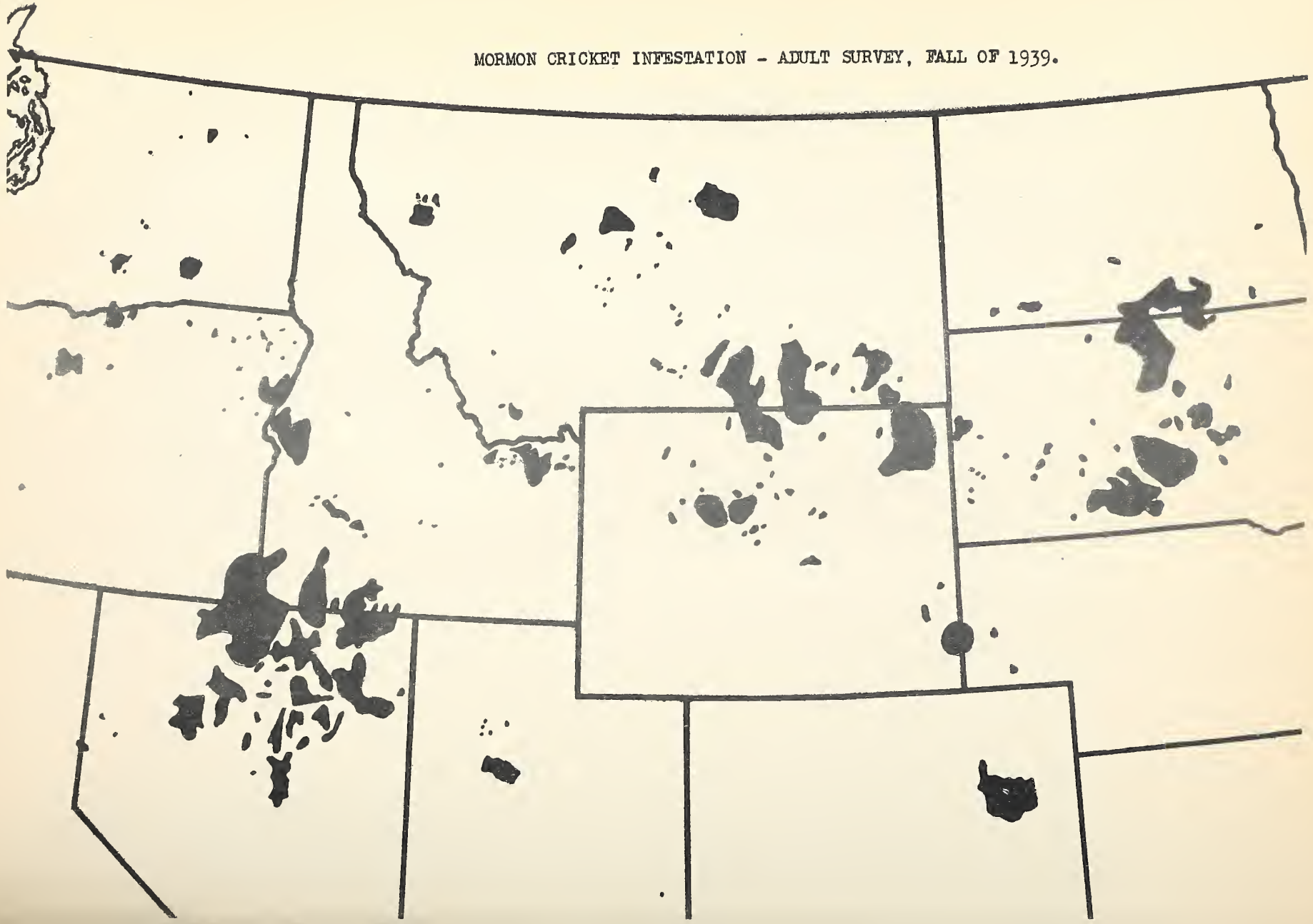
The seasonal development of the chinch bug during 1939 largely duplicated that of 1938. The threat of rather general moderate-to-severe infestations from central Ohio across Indiana, Illinois, southern Iowa, most of Missouri to southeastern Nebraska, eastern Kansas, and eastern Oklahoma was mostly removed by the cold wet spring, which delayed flight from hibernation quarters to the small grains and later destroyed most of the nymphs of the spring brood. As a result, damage was restricted to comparatively few scattered localities throughout the area. Some local damage was also reported from Michigan, Wisconsin, South Carolina, and Texas. However, as a result of drought over the area late in the summer and fall, the second-brood nymphs (and third-brood nymphs as reported from Oklahoma and Kansas) had unusually favorable conditions for completion of their development and subsequent flight of adults to winter hibernation quarters. Early returns from a survey covering the chinch bug area, which is not yet completed, and information from various State entomologists, indicate sufficiently heavy concentrations of bugs present in winter hibernation from north-central Ohio across north-central Indiana and Illinois, central and southern Iowa, most of Missouri, to southeastern Nebraska, eastern Kansas, and Oklahoma, to produce widespread moderate-to-severe infestations next spring and early summer, provided weather conditions are favorable to the bugs. Illinois reports the largest numbers of bugs in winter quarters in some localities since the fall of 1933. (P. Luginbill and C. Benton, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

MORMON CRICKET

The first hatch of the Mormon cricket was reported on March 10 in Oregon and on March 14 in Nevada. After these dates hatching was reported as continuous and even, over the entire infested area until the last of April, when most of the eggs had hatched. Severe infestations developed in most of the infested area; however, material damage to cultivated crops was prevented by intensive control operations. Mormon crickets caused unusual defoliation of young ponderosa pines near the lower edge of pine growth on the Whitman National Forest. In addition to stripping the foliage from up to 10 or 12 feet high, the migrating


GRASSHOPPER INFESTATION EXPECTED IN 1940
BASED ON FALL EGG SURVEY OF 1939
LEGEND
THREATENING
SEVERE
VERY SEVERE
BUREAU OF ENTOMOLOGY & PLANT QUARANTINE

MORMON CRICKET INFESTATION - ADULT SURVEY, FALL OF 1939.



crickets also ate many of the pine leaders. A map based on the adult survey, showing the areas likely to be infested in 1940, is appended. This is less than half the territory heavily infested last year.

HESSIAN FLY

At harvest time the surveys of wheat stubble, made by the Bureau of Entomology and Plant Quarantine field stations and cooperating State agencies, indicated that hessian fly infestations were low in wheatfields throughout Maryland, Delaware, Virginia, north-central North Carolina, Tennessee, southern Illinois, and central and western Kansas. Infestations ranged from low to moderate in eastern and south-central Pennsylvania, Kentucky, southern Indiana, southern Michigan, Missouri, Iowa, eastern Kansas, and southeastern Nebraska. There were menacing populations of flies in local fields in most of the States or districts. From moderate to heavy infestations of the hessian fly were recorded in north-central and western Pennsylvania, north-central Ohio, the northern two-thirds of Indiana, and central Illinois, and in these areas the fly was most menacing. Conditions were favorable for the hessian fly and for growths of volunteer wheat during the early part of the summer but most unfavorable during the fall period. Owing to the drought during September and October, most wheat was not planted until the suggested safe-seeding dates and as for the few early seedings very little came up in advance of the regular seeding. There was some late emergence of the fly in October but oviposition was low and larval establishment generally low or lacking. Occasional light infestations were found in regular fall wheat seedings in Indiana, Illinois, Maryland, Pennsylvania, Kansas, and Missouri, with possibilities of minor infestations in local fields, but with little likelihood of severe or general injury to the 1940 crop in any part of the Wheat Belt. (W. B. Cartwright, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ALFALFA WEEVIL

The following summary of alfalfa weevil conditions during 1939 is based on reports from State and county officials, supplemented by limited observations of the alfalfa weevil laboratory staff. Data assembled by W. E. Shull indicate that in Idaho severe weevil damage was general in the upper Snake River Valley and was spotted in south-central counties and in the western counties of Canyon and Owyhee. Severe damage was general in Douglas County and was spotted in Churchill, Lyon, Washoe, and Elko Counties, Nev., according to George G. Schweis. W. W. Owens reports that weevil damage was fairly common in Utah, being most severe in Sanpete and Sevier Counties and in the seed areas of Millard and Uintah Counties. In California this season weevil abundance reached a general level from three to four times as great as during any previous season but, notwithstanding this fact, damage was negligible. In western Colorado economic damage was confined to a few fields, weevil injury being considerably less than in 1937 and 1938, according to J. H. Newton. There was no damage to the first crop in the Rogue River Valley of Oregon, and in Nebraska, except for a single field in the western part of Scotts Bluff County, no noticeable damage occurred. C. L. Corkins reports alfalfa weevil damage in 1939 as the most severe ever experienced in Wyoming, particularly in Fremont and Uintah Counties. In other sections of the weevil territory damage was slight, negligible, or unreported. The season's scouting by Federal and State officials, already reported in the Insect Pest Survey Bulletin, resulted in original discovery of the alfalfa weevil in Crook County, Wyo., Larimer County, Colo., and Morrill and Sheridan Counties, Nebr., and confirmed discovery of the weevil in Big Horn County, Mont., during 1938. (J. C. Hamlin, Bureau of Entomology and

Plant Quarantine, U. S. D. A.)

VETCH BRUCHID

In North Carolina the eggs of the vetch bruchid began to appear a week later than was the case in 1938. The first eggs were observed on May 11 and larvae did not emerge until about May 20. This was due, it is believed, to the unseasonably low temperatures prevailing during April. In May the known distribution of the vetch bruchid in the Eastern States was extended in North Carolina into Beaufort, Pender, and Wilson Counties and in South Carolina into Abbeville, Anderson, Chester, Greenwood, Laurens, and Union Counties.

Six shipments of the parasites Tetrastichus sp. and Triaspis thoracicus Curt. were released at Salisbury and Statesville, N. C. In August operations were begun at Carlisle, Pa., in an attempt to breed the hymenopterous egg parasite Triaspis thoracicus in numbers from a stock of 3,000 adults supplied by the Division of Foreign Parasite Introduction, using Acanthoscelides obtectus Say as the host. By the end of September some 26,500 eggs of the latter insect had been exposed to parasitization.

The discovery of the vetch bruchid in August 1938 in the Willamette Valley, Oreg., occurred at too late a period in the seasonal development of the insect to permit a thorough survey for the purpose of delimiting the area of infestation. Such a survey was therefore conducted in 1939 in southern Washington and northern Oregon by the Bureau, assisted by the experiment stations of both States. The following counties were found infested in Oregon: Clackamas, Deschutes, Hood River, Marion, Wasco, Washington, and Yamhill; in Washington: Clark, Cowlitz, Klickitat, and Skamania. The areas exhibiting greatest abundance of the bruchid were Hood River County, Oreg., and Klickitat County, Wash., where volunteer hairy vetch was growing abundantly in the orchard districts. West of the Cascade Mountains, in proximity to extensive seed-growing areas, B. brachialis was found in numbers in eastern Clark County, Wash., and in Multnomah, Clackamas, and Washington Counties, Oreg. The infestation in the seed-growing sections of western Oregon is still slight and the evidence seems to indicate that infestation in the Pacific Northwest originated in the Cascade orchard district near Hood River, Oreg., and White Salmon, Wash. Although this is not a seed-raising section, vetch was extensively used here as a cover crop some years ago, and probably European seed carrying the bruchid was introduced at that time. The insect thus may have reached the vetch seed-growing areas west of the Cascades by natural spread, and it is now distributed thinly over an area of approximately 3,000 square miles in that region. The first adults were observed this year in western Clackamas County on April 17. Mating was in progress near Corvallis, Oreg., on May 19 and eggs were being deposited on May 28. First-instar larvae were observed on June 16.

The first indication yet obtained regarding the possible place of hibernation of this species was when members of the Bureau staff at Forest Grove, Oreg., found adults at Wilsonville, Oreg., on October 13,1939, hidden under lichens and mosses on the trunk and main limbs of an oak tree standing on the edge of a heavily infested field. Examination of similar locations in the Southeastern States had failed to show the presence of hibernating beetles. (W. R. Walton, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

JAPANESE BEETLE

The 1938-39 brood of the Japanese beetle (Popillia japonica Newm.) was characterized by a consistent retarded development in each of the stages. Following an unusually late development of larvae in the fall of 1938, a higher-than-normal percentage of larvae entered hibernation as second instars. A somewhat wet, cool spring appears to have further retarded development so that general emergence of beetles in 1939 was from 10 days to 2 weeks later than normal.

At the close of the 1939 beetle season the area of general distribution was estimated to occupy approximately 16,300 square miles, an increase of 1,183 square miles over that of the previous year. This area was distributed among the various States as follows: Connecticut, 286 square miles; New York 1,141; New Jersey, 7,250; Pennsylvania, 5,013; Maryland, 1,546; and Delaware, 1,064. The following points roughly define the limits of the area of general distribution: Lincoln and Edwardsville, Del; Church Hill, Elkridge, Ellicott City, Lutherville, and Norrisville, Md.; Brogueville, West York, New Kingstown, New Buffalo, Hershey, Hamburg, Nazareth, and Stroudsburg, Pa.; Andover and Pompton Lakes, N. J.; Suffern and West Point, N. Y.; and Danbury and Stratford, Conn.

The regional concentration of beetles varied markedly throughout the area of general distribution, as indicated in the accompanying map. As has been the case for the last several years, the infestation was most severe in northern Delaware, northeastern Maryland, and extreme southeastern Pennsylvania. Within this area the infestation, generally speaking, was of about the same severity as that observed in 1938, with heavy foliage injury advancing from 1 to 5 miles beyond points observed the preceding year. Throughout the remainder of the area of general distribution the infestation was somewhat spotty, as compared with 1938, in many areas appearing to be heavier than in 1938, while in others it was lighter. On Staten Island and in most of the New York metropolitan area the infestation was not as heavy as the previous year, while north of the city and throughout Connecticut there appeared to be a decided increase. For the first time in several years an increase was observed in the oldest infested area in the vicinity of Moorestown, N. J.

A survey of a number of secondary centers of dispersal situated on the Eastern Shore of Maryland and Virginia revealed that a considerable amount of dispersal had taken place. The largest area generally infested involved approximately 415 square miles in Somerset and Worcester Counties, Md., and Accomac County, Va.

In New England there was in 1939 a general increase in beetle abundance at practically all of the known colony sites, the increase being especially noticeable throughout the southern half of that area. General population increase and local dispersion appears to have occurred at such large centers as metropolitan Boston, Mass., Providence, R. I., and New Haven and Bridgeport, Conn. The natural dispersion of the insect in southwestern Connecticut is gradually meeting and fusing with localized colonies in suburban areas along Long Island Sound. (C. H. Hadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Trapping activities outside of the main Japanese beetle infested area disclosed a very moderate spread of infestation during the last year. The 1939

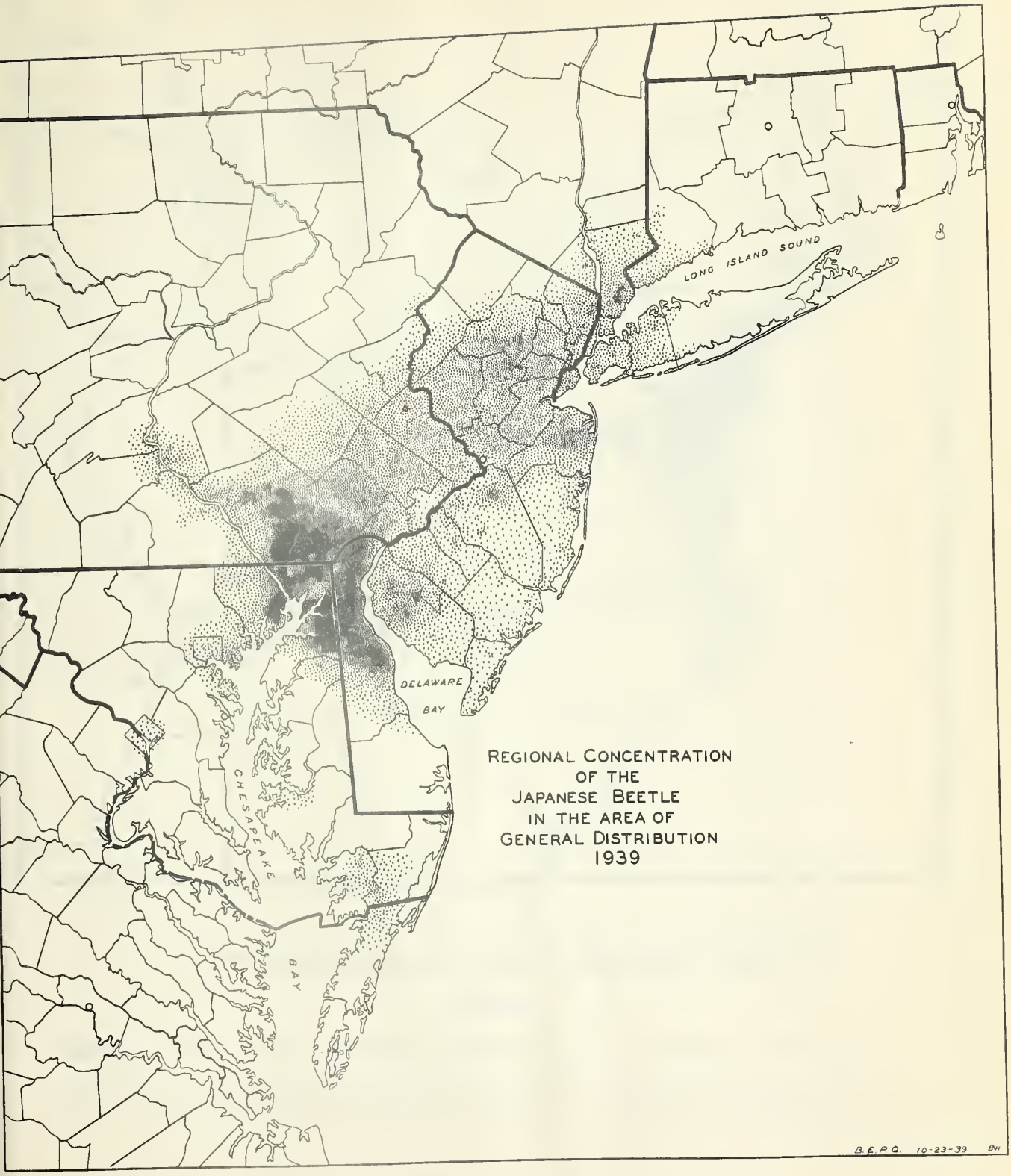
trapping program started on April 18 in the Southern States and extended to September 7 in some of the northern cities in which beetles had been caught during the season. A total of 79,537 traps were distributed by the Bureau in 491 cities and towns located in 37 States. With the exception of Arkansas, Montana, Oklahoma, and South Dakota, some degree of trapping was undertaken in all States outside of the main infested territory. The major portion of the trapping was concentrated in States already partially infested or contiguous to the main infested zone, and in cities in which isolated infestations had been found. This centered most of the trapping in New York, North Carolina, South Carolina, Ohio, Pennsylvania, Virginia, and West Virginia, and in Atlanta, Ga., Chicago, Ill., Indianapolis, Ind., Louisville, Ky., Detroit, Mich., and St. Louis, Mo. Trapping in States west of the Mississippi River was limited to the operation of traps by the network of Bureau field stations scattered throughout the Midwestern and Western States. Results during 1939 paralleled those of 1938 in that few first-record infestations were found and most of these consisted of a few beetles each. Of the 35 localities in which beetles were trapped for the first time, 30 contained infestations of an incipient nature. Only 5 were large enough to warrant quarantine or control measures. There were 67 carry-over infestations in nonregulated territory, 32 of which were still of a minor nature. Twenty-four residual infestations were of some magnitude. Most of these were adequately treated with lead arsenate. There remained at the end of the year 11 localities in Ohio, Pennsylvania, and North Carolina that were subject to quarantine. Reports from Maryland officials in charge of the cooperative campaign for Japanese beetle retardation in that State show that approximately 100,000 traps were set throughout the State during the summer of 1939 and that these traps caught over 104 tons of beetles. This is a tremendous increase over the 42.3 tons trapped in 1938. In addition to the trapping, this retardation program involved spraying, dusting, soil treatments, biological control, and adjustment of agricultural practices. (William Middleton, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

FRUIT APHIDS

Early in season aphid eggs were reported in abundance from the northeaster one-fourth of the country. Warm weather caused hatching to start earlier than usual, and outbreaks in most of the fruit-growing districts appeared imminent. Cool weather late in April and May retarded development of the aphids, and parasites were probably active. The combination of environmental factors tended to keep the insects in check and the impending outbreaks failed to materialize. The apple grain aphid and the green aphid caused some injury in scattered localities. The most injurious species, the rosy aphid, caused considerable injury in western New York, around Staunton, Va., and in southwestern Indiana. The species also became abundant late in the season in Georgia, where it caused some injury.

CODLING MOTH

This pest entered the season in many localities with a moderate carry-over and, although the crop was heavy, control was largely successful early in the season. Warm, dry weather late in the season rendered control more difficult and permitted development of a large population over wide areas. First emergence was noted in Alabama on April 4, in northern Georgia and at Yakima, Wash., late in April; in southern Indiana, western Kentucky, and the valley of Virginia early in May; in the Hudson Valley late in May. First-brood adults were noted late in



REGIONAL CONCENTRATION
OF THE
JAPANESE BEETLE
IN THE AREA OF
GENERAL DISTRIBUTION
1939

B.E.P.Q. 10-23-39 BH

DISTRIBUTION OF THE JAPANESE BEETLE

1939

AREA CONTINUOUSLY INFESTED BY NATURAL SPREAD.

LOCALIZED COLONIES OR POINTS OF MINOR OCCURRENCE.

BUREAU OF AGRICULTURAL ECONOMI

June in Virginia and the middle of July in the Hudson Valley. Second-brood larvae were active in July in the Middle States, and third-brood activity persisted into early fall. Missouri and Illinois reported first brood well "bunched," increasing facility of early control. The species was noted as quite active and numerous, especially late in the season, in Delaware, Indiana, Kansas, Missouri, New Jersey, Oregon, Utah, Virginia, and Washington. It was below normal in Wisconsin and Minnesota and about average in Massachusetts. In New York the situation varied locally. Damage to cherries was reported from Utah. Arkansas reported small numbers following a small crop in 1938. (F. M. Wadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ORIENTAL FRUIT MOTH

The oriental fruit moth in general seemed to be present in only normal numbers or less, in the Middle Atlantic, North Atlantic, and Middle Western States. It appeared to be somewhat above normal in the Southeastern States, although a late start in the spring was observed in some cases. It was noted as about normal or a little below normal in Massachusetts, Connecticut, and New York. Little injury was reported from Delaware. From southwestern Virginia to southern New Jersey 14 localities were sampled, infestation of ripe peaches (Elberta and similar varieties) ranging from 1 to 35 percent. Oriental fruit moth caused considerable injury in South Carolina, Tennessee, Georgia, Alabama, and Mississippi, and its work was observed in northern Florida. It was observed in Indiana and noted as injuring apple. It was not especially noted in Illinois and Michigan, and was recorded as scarcer than last year in Kentucky. It was widely reported but not very injurious in Missouri. Injury was quite noticeable in Ohio. (F. M. Wadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EASTERN TENT CATERPILLAR

In 1939 this species was not often reported as especially abundant. In general, fewer reports were made than in 1938, and more decreases than increases were reported. Abundance was only local in character where it occurred. The species, however, was widely observed from Mississippi and Florida to Wisconsin and Maine. Hatching was reported early in March in Mississippi, later in March in North Carolina, early in April in Delaware, in April in New Jersey and Pennsylvania, late in April in New York, and early in May in Vermont and Maine. Larval activity was noticeable late in March in northern Florida, early in April in Alabama and Mississippi, in April in Virginia and the Carolinas, in May in New Jersey, New York, Pennsylvania, and Wisconsin, late in May in Michigan, and early in June in Maine. (F. M. Wadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PEAR PSYLLA

This species attracted considerable attention in 1939 because of its unexpected appearance in the Pacific Northwest. Elsewhere it did not receive much notice. It was observed in New York, where adults became active late in March, eggs were present late in April and numerous early in May, and hatching began the middle of May. It gave only local trouble and control was reported as not difficult. It was also observed in Lebanon County, Pa. In Washington it was first observed in the Spokane Valley late in July. Numbers were considerable and in some cases injury was done. In August it was found that the infestation extended a few miles across the Idaho State line. The infested area is a few miles

across, contains several thousand pear trees, and is separated from commercial pear-growing areas by a considerable distance. (F. M. Wadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

COMSTOCK'S MEALYBUG

Comstock's mealybug on apple is receiving considerable attention in Virginia where it causes a black sooty mold to grow on the fruit. This condition became evident in 1934 and since that time the insect has spread and the fungus is causing serious injury. In 1939 it was very injurious. Since the insect was first identified by H. Morrison as appearing in the United States in Indiana and Maryland in 1916, it has spread to include Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Virginia, West Virginia, South Carolina, Florida, Ohio, Michigan, Iowa, Mississippi, Louisiana, and California. We have questionable records from North Dakota and Washington. It was reported for the first time in 1938 in Ohio and Michigan, and both States reported infestations again in 1939. The infestation on apple in Virginia in 1939 was the most general that has been observed. There are three general areas of infestation, the Crozet area, the Roanoke area, and the Winchester area.

BEET LEAFHOPPER

Above-normal fall temperatures in 1937, together with sufficient precipitation, permitted a good germination of downy chess. Excessive precipitation in March 1938 permitted a much more dense and widespread germination, resulting in excellent stands of this nonhost in certain Russian-thistle areas. Dense stands of downy chess intermixed with Russian-thistle, the most favorable summer host, reduces the suitability of such areas for reproduction of large numbers of leafhoppers. These summer host-plant conditions and a small spring generation of leafhoppers were important factors in the production of a low fall population. September surveys of Russian-thistle areas in southern Idaho in 1938 showed the lowest beet leafhopper population recorded in the last 5 years, although fall weather conditions before the first killing frost, which occurred throughout southern Idaho on October 18, were favorable for the complete development of a late-summer or fall generation of the leafhopper. Late-fall and winter host plants, such as green tansymustard, flixweed, and peppergrass, germinated freely as a result of the precipitation during October and early in November; consequently, the comparatively small number of leafhoppers produced during the summer on Russian-thistle found suitable fall and winter host plants and entered the winter under favorable conditions. The winter was mild and dry and, in general, was favorable for survival.

Early spring surveys in the desert breeding areas showed the lowest population of overwintered leafhoppers since 1936. Poor survival of green tansymustard resulted in a very sparse growth of this important spring breeding host plant in most sections. The spring generation of beet leafhoppers in southern Idaho was very small, owing to the low population of overwintered leafhoppers and a scarcity of favorable host plants on which to reproduce. The initial movement of the sprin generation into the cultivated area occurred on May 17 and the peak was reached on June 14. The number of leafhoppers in the spring movement in 1939 was approximately one-third as large as in 1936, one-thirty-fifth as large as in 1937, and one-tenth as large as in 1938. Surveys of commercial beanfields in July showed that curly-top injury to beans was very light, ranging from 0 to 3.0 percent in the garden varieties and from 0 to 1.0 percent in the Great Northerns, a dry-bean

variety grown extensively in southern Idaho. Fall populations of the beet leafhopper in southern Idaho in 1939 were the lowest recorded since the institution of the extensive fall population survey in 1934 to obtain information on the number of leafhoppers that may enter the winter. Weather conditions early in October were generally favorable for fall germination of the fall and winter hosts of the beet leafhopper. A survey of the desert breeding areas in November revealed that a very sparse, though general, germination of the weed host of this insect had occurred in all sections of southern Idaho. Weather conditions up to the middle of December have been favorable for leafhopper survival.

Overwintering beet leafhoppers were found at 16 of the 21 points examined in the Billings, Mont., area in April, indicating a comparatively high winter survival for Montana. The infestation extended down the Yellowstone River Valley from Columbus to Custer, Mont., a distance of 96 miles. Excessive precipitation (9.05 inches), combined with low temperatures during the last half of May and the first 20 days of June, was evidently the important factor in limiting reproduction. A survey of beet fields in the Billings area in August revealed a very light infestation. A survey of beet fields for overwintered beet leafhoppers in the Nyssa, Oreg., and Toppenish, Wash., districts in the last few days of April showed the presence of overwintered leafhoppers in all fields examined. The infestation per field in the Oregon area ranged from 8 to 24, with an average of 15.6, and in the Washington area from 3 to 37, with an average of 13 leafhoppers per 100 feet of row. The infestation of overwintered beet leafhoppers in beet fields in south-central Idaho averaged 5.4 per 100 feet of row the first few days of May. (J. R. Douglas, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

In northern Utah the lack of precipitation in April and May 1938 reduced the germination of Salsola pestifer, the summer host plant of the beet leafhopper. In its place, Bromus spp. germinated very early in the spring and utilized the late winter precipitation. The stand of Russian-thistle in the fall of 1938 was still reduced, but the population of the beet leafhopper was similar to 1936. The winter and spring host, Erodium cicutarium, germinated early in the fall and the leafhoppers made a direct transfer from the summer host. The population of the leafhopper on the Promontory Points breeding area in the spring of 1939 was much higher than in 1938. The percentage of viruliferous beet leafhoppers of the overwintering type was, however, about one-third as high as 1937 and two-thirds of that of 1938. The percentage of viruliferous beet leafhoppers from the first brood, or the brood that moves to the cultivated crops, maintained a low percentage of viruliferous hoppers, since the percentage was about half that of 1937 and one-third that of 1938. The peak of the local migration occurred about June 1. The damage to tomatoes was noticeably less than in 1938 or 1937. The damage to sugar beets was less than in 1938. (H. E. Dorst, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BEET WEBWORM

From 1936 to 1938, inclusive, the beet webworm was a pest of considerable economic importance on beets in south-central Idaho. Approximately 4,000 acres of beets were sprayed each season. During this period the infestation occurred in practically the same localities year after year. The first flights of moths noted in 1939 were in the Castleford and Burley areas on May 10 and 11, respectively. Eggs were numerous in beet fields on June 3 and occasionally a worm was noted. Very few of these eggs hatched. From about June 10 to June 24, worms were

fairly common, and then decreased in numbers to about July 1. After this time only an occasional worm was noted throughout the remainder of the season.

MEXICAN BEAN BEETLE

The survival over winter of the Mexican bean beetle at Columbus, Ohio, was relatively high in the spring of 1939 (33 percent). No doubt high survival was general in the Ohio Valley, as the insect was numerous in the field at South Point and Cincinnati, Ohio, and at Louisville and Lexington, Ky. In southern Ohio beans that were not treated with insecticides were defoliated by the beetle, and insecticide sales in the Ohio Valley were higher than in previous years, according to some dealers. The beetle was numerous and injurious throughout eastern Kentucky, eastern Tennessee, and western North Carolina and South Carolina, and was numerous and injurious even in some locations in the coastal plain. (N. F. Howard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Note.--The Mexican bean beetle was reported in only moderate abundance generally, east of the Mississippi River, up to the last of June, with the exception of a few local heavy infestations in the South, especially in southern Georgia and across the State line in Gadsden County, Fla. Injury became evident late in June and thereafter until fall the insect reproduced rapidly and caused severe injury in many places. This pest was found for the first time this year in Sumter and Choctaw Counties, Ala., and Jefferson County, N. Y. The infestation in New York is some distance from previously known infestations.

TOMATO PINWORM

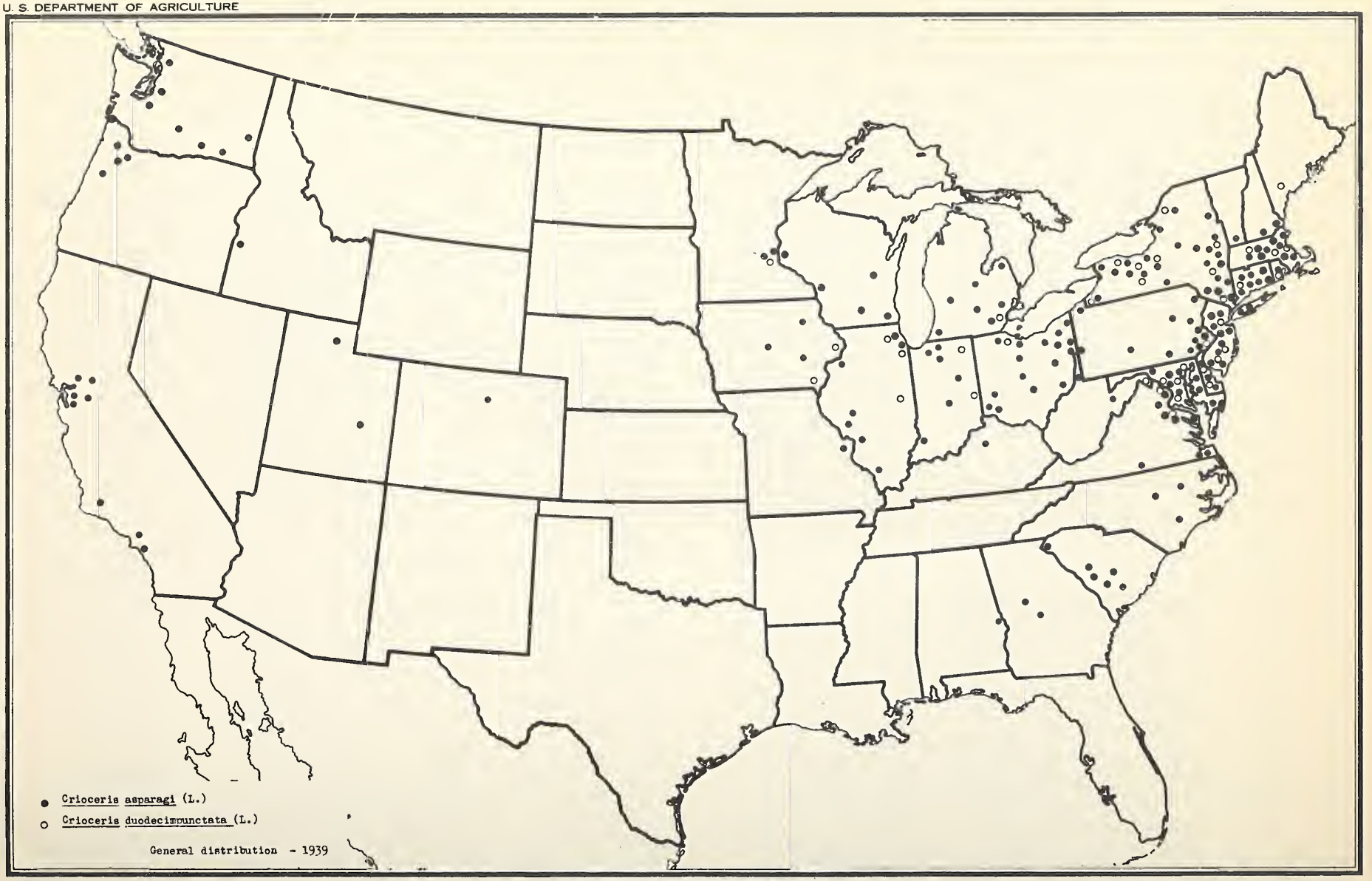
The tomato pinworm, which was much less abundant during the first part of last season, increased rapidly in numbers during September, October, and November. In the Yorba Linda area, where the pinworm caused 40- to 60-percent fruit injury by July 15, 1938, only 3 percent of the fruit was injured at the same date in 1939. By the end of the season (December 9), following several weeks of hot weather, the pinworm had built up sufficiently to cause 8 to 34 percent injury.

During July a survey of 10 representative fields in the San Pedro area of Los Angeles County showed the pinworm present in only 5 fields. The degree of injury ranged from 1 to 18 percent. In other areas of Orange and Los Angeles Counties and in northern San Diego County pinworm injury, which was usually absent in lowland areas, was not over 7 percent in the warmer upland areas by July. Later in the season only traces of pinworm injury were reported in lowland areas, while it built up to injurious numbers in late upland fields near San Fernando and Santa Ana. At San Fernando pinworm injury built up from 8 percent injury September 28, to 30 percent injury by December 4. In the upland areas near Santa Ana, a representative field showed an average of 58 percent of pinworm injury by November 21. (J. C. Elmore, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PEPPER WEEVIL

Owing to cold weather during the winter of 1938-39, there was little nightshade and no berries in which the pepper weevil could breed early in spring. This resulted in a small winter carry-over of adults. The spring and early summer of 1939 were cool, so there was only a light infestation in most of the pepper-growing areas, and practically no commercial damage to the chili pepper crop. But, on account of a very warm fall, there was a gradual build-up of infestation and consequently heavy damage to fields of bell peppers. There is now (Jan. 1, 1940) a

U. S. DEPARTMENT OF AGRICULTURE



Mar.,1920

OUTLINE MAP OF THE UNITED STATES

high weevil population which, unless checked before the winter is over, may cause heavy infestations in the 1940 crop. (Roy E. Campbell and J. C. Elmore, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ASPARAGUS BEETLES

The common asparagus beetle has been reported for the last 2 years in much greater abundance than heretofore. It was reported from new localities in States known to be infested, and Alabama and Idaho reported first State infestations in 1938. This beetle was first reported as injurious in this country on Long Island, N. Y., in 1859, evidently having been introduced several years before. It spread northward and southward along the coast and by 1885 it was reported from Massachusetts to Norfolk, Va. By this time it had spread westward to Geneva, N. Y., through eastern Pennsylvania, and near Washington, D. C. There was evidently a commercial jump, for in 1884 the insect was reported from western Pennsylvania bordering Ohio, and in 2 or 3 years from the adjoining part of Ohio. From this focus of infestation the insect spread around the southern part of the Great Lakes, reaching northeastern Illinois in 1902 and southeastern Wisconsin in 1914. By 1920 its distribution included an area enclosed by a line from southeastern Minnesota, Iowa, Illinois, Kentucky, and Virginia to the Atlantic. In 1926 it was reported from Missouri. Its southwestern movement seems to have been slow. It was not reported from South Carolina until 1929. In 1937 it was reported from Georgia and in 1938 from Alabama.

In the western part of the United States it was reported as established in the San Francisco Bay district in 1906, and was later reported from north-central California. It was reported from southern California in 1928 and since that time has occasioned considerable injury. It was reported from Oregon in 1917. In 1924 it was reported from southeastern Washington, and was not seen west of the Cascades until 1936. Further spread in that part of the State was observed in 1939. The insect was reported from Colorado in 1915 and has spread very little. In 1937 it was observed near Great Salt Lake in Utah and in 1938 in southwestern Idaho.

The 12-spotted asparagus beetle, a rarer and less injurious species, occurs only in the northeastern one-fourth of the country. It was first discovered in the United States near Baltimore, Md., in 1881. From there it spread, especially to the north and west. To the south the spread was slower and it has not reached South Carolina, where considerable asparagus is grown. It was reported in the eastern part of the Great Lakes region in 1913 and moved westward, reaching Chicago in 1925 and eastern Iowa in 1931. It was found at St. Paul, Minn., in 1939. The attached map shows approximately the distribution.

BOLL WEEVIL

The total loss of cotton in the United States caused by the boll weevil was probably less in 1939 than any year since 1933, except 1938, and was about equal to the losses caused by the weevil during those years. In some States the weevils caused more damage in 1939 than for several years; in other States less damage. Boll weevils caused notably less damage in North Carolina, South Carolina, and northern Georgia during 1939 than in 1938, but they were more abundant and caused greater damage in Florida, southern Georgia, Alabama, and Mississippi in 1939 than in 1938. In Louisiana and Texas the weevil population and damage was apparently about the same in 1939 as in 1938. The Bureau conducted no cotton-insect investigations in Virginia, Tennessee, Arkansas, and Oklahoma in 1939 and had no opportunity to observe the boll weevil damage in those States.

The emergence of boll weevils in the hibernation cages and the number of weevils found in woods trash in Florence County, S. C., was higher in 1939 than in 1938, indicating that the weevil population in the fields would be higher; however, field studies made during the spring showed that for some reason this expected increase in the field population did not develop, and the number of weevils in the cotton fields was about normal. Conditions were favorable for cotton to grow fast and mature early and the boll weevil damage in South Carolina in 1939 was notably less than in 1938. In Madison Parish, La., the boll weevil population was rather light during the fall of 1938 because most of the cotton had been defoliated by cotton leaf worms. In the hibernation cages 1.16 percent of the weevils survived, as compared to 1.13 percent in the spring of 1938. This was a considerably higher survival than in 1933, 1935, and 1936, but much lower than in 1932, 1934, and 1937. However, examinations of Spanish moss and surface trash in March 1939 indicated the presence of more weevils than in 1938, and field counts made in May and June 1939 revealed that the weevil population in the fields was greater than during any spring since 1935, but lower than during each year of the 4-year period 1932-35. Weather conditions during June 1939 were not favorable for the boll weevils, and early planted cotton developed with little weevil damage. In July and August conditions were more favorable for the weevils and late-planted cotton was seriously damaged, but in these fields the damage was not so great as would have been the case had not June been unfavorable for boll weevil increase.

At State College, northeastern Mississippi, the overwintered weevils in the cotton early in the season of 1939 were not so abundant as in the spring of 1938, when they were more numerous than in any spring since the laboratory was opened, in 1934. However, conditions were favorable during June for boll weevil increase throughout northeastern Mississippi and, owing to the high boll weevil population and excessive rainfall, the cotton crop produced in that area was only about 30 percent of normal. This serious reduction in yield could have been largely avoided had more of the cotton been poisoned for boll weevil control. (R. W. Harned, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BOLLWORM

The bollworm was generally distributed in 1939 and caused more damage than usual in Mississippi and the other Southeastern States, except Florida, but did not cause as severe damage as usual in Texas and adjacent States, where it often causes serious losses. In Florida the bollworm infestations were spotted and the bollworm caused less damage to the cotton crop than usual. The total damage to cotton in the United States was probably less than usual.

This insect was reported as early as April 5 in the egg stage on alfalfa near College Station, Tex. Eggs were found on the terminal buds of cotton in Calhoun County, Tex., at the rate of 7 eggs per 100 terminal buds on June 3, 1939. A few worms were also observed feeding in the terminal buds of cotton at that time. They were reported to be causing some damage to cotton squares in Tift, Berrien, and Cook Counties, Ga., on June 17; at Troy and Hartselle, Ala., on June 21; and in Washington County, Miss., on June 24. Moths of the bollworm were observed at Florence, S. C., on June 17. During July bollworms were destroying squares and bolls in South Carolina, Georgia, Florida, Mississippi, and in many parts of Texas. The infestations were usually light, but were severe in isolated fields in Florida, Georgia, and Texas.

During August bollworms were more abundant than usual in Georgia, Florida, Alabama, Mississippi, and Arizona and caused serious damage in scattered fields in many counties in those States. Although the worms were reported from many parts of Texas and caused serious damage in some fields, they did not cause great losses over large areas, as in some years. During September the worms were reported from Georgia, Mississippi, and Texas, but in reduced numbers as compared to July and August. (R. W. Harned, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

THE COTTON LEAF WORM

During 1939, the cotton leaf worm was less abundant and caused less damage than usual. It was first reported in the United States from Cameron County, Tex., on May 4 when a three-fourths-grown worm was collected at San Benito. The first leaf worms in Calhoun County, Tex., were observed on May 17 when two were taken from cotton 7 miles west of Port Lavaca. (In 1938 the first leaf worms recorded from the United States were taken in Calhoun County on May 2, the earliest record in this country since 1922.) The leaf worm population increased slowly and the moths did not spread as rapidly as in some years. After May 17 no leaf worms were reported from Calhoun County until one was observed on June 9 and several on June 22. On June 29 leaf worms about two-thirds grown were reported from the Brazos Bottoms near College Station, Tex. By July 19 they were beginning to appear in injurious numbers in several counties of central Texas, along the Brazos River, and it was reported that control measures were being applied in Nueces, Fort Bend, and Brazos Counties. Although leaf worms were reported in small numbers from other counties, they were less numerous than usual in Texas during June, July, and August. They were, however, reported by August 9 from Kaufman County in northern Texas, Runnels County in west-central Texas, and at Presidio in the Big Bend. On August 16 severe ragging of cotton plants was reported in the Coastal Bend area, and control measures were being used generally in the Upper Coastal area and as far north as McLennan County. By August 19 most of the cotton in Calhoun County had been defoliated, except the fields that had been protected by poison. At Presidio in the Big Bend, only slight defoliation was reported. On August 26 the leaf worms were numerous in late-planted cotton in McLennan, Falls, and Limestone Counties, but the damage was not very serious as most of the cotton had been planted early. By September 2, nearly all late-planted cotton in these three counties was infested. By August 30 the worms were reported in Dickens County, northwestern Texas, and in Crosby, Lubbock, and Lynn Counties, on the Southern Plains. By September 9, most of the cottonfields in Presidio County had been stripped by the worms.

In 1939 the cotton leaf worm moths apparently entered this country through Florida, as well as Texas, as that was the second State from which they were reported. Heavy infestations were reported from Seffner in Hillsborough County on July 8, and from Trenton in Gilchrist County, Fla. On July 15 they were observed in Putnam and Union Counties and were causing damage in Gilchrist County. On August 12 they were reported as occurring in small numbers in Alachua, Union, Marion, and Lake Counties but seemed to be held in check by some natural control. The Georgia infestation apparently came from Florida but the worms were not reported from Georgia until August 25 when a few were found in Echols County, near the Florida State line.

The moths probably spread from Texas into Louisiana. From that State the first leaf worm, a fourth-instar larva, was reported from Tallulah, Madison Parish, La., on July 16 and by August 23 the worms were abundant in some localities

in northern Louisiana. By September 23 from 50 to 75 percent of the cotton was defoliated. The moths probably spread from Florida into Mississippi, as the first leaf worms in that State were found in the Gulf Coast region in George County on July 29, and later in Jackson County. On August 14 they were reported from Tate and Washington Counties in the northern and western parts of the State and from Oktibbeha County in the northeastern part of the State on August 17. These infestations were probably started by moths from Louisiana as they were closer to the infested areas in Louisiana than to those in southern Mississippi, and also as most of the worms in the George County infestation were reported to have been destroyed by parasites.

The first leaf worms in Arizona in 1939 were found at Sahuarito, Pima County, on August 28, exactly 1 month later than in 1938. (They had previously been reported from Marana on August 17 but this report was not officially verified.)

Leaf worms were not reported in South Carolina and Tennessee until September and during October isolated and scattering infestations were reported from those States. Cotton leaf worm moths were reported at lights in Michigan on September 15 and in large numbers by September 22. (R. W. Harned, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

COTTON FLEA HOPPER

Cotton flea hoppers caused less damage than usual in 1939. They were first reported on cotton on April 3, in Calhoun County, Tex. In June they were reported from many counties in Texas, Oklahoma, Louisiana, Mississippi, South Carolina, and Georgia, but only in limited areas in Texas, Oklahoma, and Mississippi were they numerous enough to cause serious damage. During July and August they were reported as present in South Carolina but doing no damage, and as causing some damage in limited areas in Mississippi, Louisiana, Oklahoma, and Texas.

Hibernation studies in Calhoun County, Tex., showed that the peak of emergence in 1939 was on April 21, 7 days earlier than in 1936 and 1938, but later than in 1933, 1934, 1935, and 1937. During the week ended April 22, 62.6 percent of the seasonal emergence occurred. The emergence from hibernation in Calhoun County during 1939 averaged 19.45 flea hoppers per croton plant. (R. W. Harned, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

GLADIOLUS THRIPS

The status of the gladiolus thrips during 1939 has not changed from that of the last two preceding years. Judging from the nature of inquiries received, it is still a serious pest in the small homeyard plantings, but commercial growers seemingly are more familiar with its habits and injuriousness and therefore are better able to cope with it. No new localities have been recorded. (C. A. Weigel, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ROSE MIDGE

Only a few reports were received on this pest during 1939 by the Bureau of Entomology and Plant Quarantine. It is felt that the dearth of inquiries is due to the fact that this insect has had considerable publicity in the American Rose

Annual for 1939, the Yearbook of the American Rose Society. As a result, rose growers are now more familiar with this pest and are better able to cope with it, so that fewer inquiries are being received. This does not mean that this pest is less injurious to garden roses than formerly, because in observations conducted on an infestation in Washington, D. C., the rose midge caused such severe injury that the grower, a leader among the local rose enthusiasts, was unable to enter any roses for the 1939 Annual Rose Show. In the past he has been able to grow and enter sufficient blooms to carry away several first prizes. By the end of August practically all of the new growths were attacked, resulting in almost complete destruction of the subsequent buds. Activity ceased the end of October. The infestation on Long Island was apparently brought under control, the grower reporting that a successful crop was grown and harvested. A record of an infestation of 8 years' standing (from 1931) was reported in the Rose Annual for 1939 (p. 113). This infestation was at Lovell, Wyo., apparently a new locality record for this insect on outdoor roses. (C. A. Weigel, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PERIODICAL CICADA

Brood XIII of the periodical cicada, the original range of which included the northern half of Illinois, eastern Iowa, southern Wisconsin, northwestern Indiana, and southwestern Michigan, appeared in isolated spots over much of its range. In 1939 it was very abundant in oak wood west and south of Chicago and extending into northwestern Indiana. Of the old records in the Eastern States, of which there is one in Pennsylvania, two in Maryland, two in West Virginia, one in Virginia, and one in Kentucky, not one was confirmed; however, the insect was observed in other localities in all of these States, except West Virginia and Kentucky, and also from northeastern Ohio. The records made in 1939 are as follows, counties being underscored:

Illinois: Northern half of State, north of line drawn from central Hancock County to central Vermillion County. Cook, parks in the suburbs of Chicago; in oak wood along on highway No. 34, westward through Du Page, Kendall, La Salle, Bureau, Henry, and Rock Island Counties.

Indiana: Lake; Laporte; Porter.

Iowa: Jackson; Linn, Cedar Rapids; Scott, Davenport.

Maryland: Calvert, near Plumpoint; Prince Georges; Beltsville, Branchville, Catonsville, College Park; Washington, Hancock.

Ohio: Cuyahoga, Brecksville; Stark, Canton.

Pennsylvania: Near crest of the mountain on highway 83 between Schubert, Berks County, and Summit Station, Schuylkill County.

Virginia: Augusta; Patrick, Stuart; Montgomery, Blacksburg; Roanoke, Glenvar, Roanoke; Smyth, Chilhowie; Wythe, Grahams Forge.

Wisconsin: All southern counties; Crawford; Dodge; Richland; Rock.

GYPSY MOTH

The hatch of egg clusters of the gypsy moth was much more pronounced than i was in 1938. Egg clusters collected and observations made in the field over quite an extended area showed a good hatch in most localities. Very little winterkill was noted and a high percentage of hatch was present in many sections of the infested area. Hatching was late and spring mortality low in 1939.

In Maine there was a considerable increase in defoliation in 1939, an increase of about 60 percent over that in 1938, the total being greater than in any other previous year. In New Hampshire there was an increase of approximately 100,000 acres, all gradations of defoliation showing a marked increase. In Vermont a great increase was noted, more defoliation being recorded in 1939 than the total recorded for the last 15 years (1925-39, inclusive). In Massachusetts there was a slight decrease in defoliation as compared with that recorded in 1938. In some sections a marked increase was noted, especially in Plymouth, Norfolk, and Bristol Counties, with a slight increase in Dukes County. There was a slight decrease in Worcester, Barnstable, and Franklin Counties, and a large decrease in Essex, Middlesex, Hampden, and Hampshire Counties. There was over a 50-percent decrease in defoliation in the section between the Connecticut River and the barrier zone. In Rhode Island there was a big decrease in defoliation recorded. In Connecticut there was a marked increase in defoliation in 1939 over that recorded in 1938. (J. N. Summers, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BROWN-TAIL MOTH

During the summer of 1939 there were not many reports of defoliation by this insect, although in some sections of southern New Hampshire a considerable amount of complete defoliation was noted. According to records received from Maine, New Hampshire, and Massachusetts, the total number of brown-tail moth webs cut by State or local crews during the winter of 1938-39 was considerably greater than the total recorded during 1937-38. In Maine the number increased from 116,000 in 1937-38 to 974,000 in 1938-39. This was due partly to an increase in infestation and partly to an increase in the number of men employed on the work. With about the same number of men working in New Hampshire and Massachusetts for the 2 seasons, the number of webs cut in New Hampshire during the 1938-39 season, increased about 100 percent over 1937-38; in Massachusetts the number of webs cut during 1938-39 increased 44 percent over the previous season. (J. N. Summers, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SATIN MOTH

Most of the defoliation noted in the New England area during 1939 was confined to single or groups of poplar trees. In Maine the infestation was general but light in most localities. In New Hampshire feeding was light, except in a few localities. In Vermont and Massachusetts the feeding was light; and in Connecticut only a small amount of noticeable feeding was noted, although in 1 locality a group of 100 large roadside poplar trees were affected. (J. N. Summers, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

WESTERN PINE BEETLE

Following three seasons of relatively light losses, an increase in activity of the western pine beetle (Dendroctonus brevicomis Lec.) developed during the 1939 season in California. This increase is aggressive and disturbing in several important areas, notably on the west side of the Sierra Nevada and Cascade Mountains in northern California. In contrast to 1937, when but 350 million board feet were killed, it is tentatively estimated that the 1939 losses will amount to 550 million board feet. In the ponderosa pine stands of southern Idaho the western pine beetle is responsible for some loss, although for the most part the infestations of this beetle can be considered as normal.

The western pine beetle was more active during 1939 than in the previous year in spite of better moisture conditions and a general improvement in tree health and vigor in Washington and Oregon. A check of 190 320-acre sample plots in eastern Oregon and Washington showed an increase of 6 percent in the number of ponderosa pines killed. The Deschutes subregion of central Oregon showed a 54-percent increase. Control operations were started on the Fremont, Deschutes, and Ochoco National Forests and were continued on the Warm Springs Indian Reservation, as well as on private lands in southern Oregon.

THE MOUNTAIN PINE BEETLE

Epidemic infestations of mountain pine beetle (Dendroctonus monticolae Hopk.) in sugar pine have been heavier than for any season during the last 10 years in California. These infestations are occurring in areas where recently there have been no similar, serious, extensive outbreaks. The mountain pine beetle continued to show signs of aggressiveness in Mount Rainier National Park, where infestation increased slightly over that of 1938. A maintenance control program is in effect in the park and it is hoped that with intensified efforts the infestation will be reduced to an endemic status by 1940. During the last season there has been no material change in the status of the bark beetle infestations of the Northern Rocky Mountain region. The mountain pine beetle continues to take an annual toll from the white pine forests of Idaho and Montana of at least 0.7 percent of the total volume. Although responsible for some losses of whitebark pine along the higher elevations of the Continental Divide, there are only light scattered infestations of the mountain pine beetle within the lodgepole pine areas. Infestations of the mountain pine beetle in limber pine and lodgepole pine are still serious on the Washakie National Forest, over a million infested trees being reported.

DOUGLAS FIR BEETLE

The Douglas fir beetle (D. pseudotsugae Hopk.) occurs in epidemic numbers in many Douglas fir stands, in the Northern Rocky Mountain region, where severe losses have occurred and are still occurring. The insect became epidemic in the Douglas fir stands along the central and southern coastal area of Oregon, where numerous groups of trees were killed on the Siskiyou National Forest and the surrounding area. This outbreak is considered as a typical local "flare-up," characteristic of this insect in the region west of the Cascade Range. Presumably the population built up in trees killed by fires that burned over this country for the last several years. No control program is considered feasible. The widespread outbreak of the Douglas fir beetle in western Wyoming is still maintaining itself, where it is estimated that there are 500,000 infested trees on the Wash-

akie National Forest alone. In other parts of the Rockies there appears to be no appreciable decline.

ENGRAVER BEETLES (IPS SPP.)

Outbreaks of engraver beetles, Ips oregoni Lec., have been a feature of the 1939 infestations in ponderosa pine in California. Extensive top killing and group killing of pole stands has occurred, both in cut-over reserves and in virgin forests. These outbreaks may be of importance because in the past they have been found to be the forerunner of more sustained and serious infestations of Dendroctonus. Extensive group killing of ponderosa pine reproduction by the Oregon pine engraver (Ips oregoni Eich.) was noted on several logging operations on and near the Ochoco, Malheur, and Whitman National Forests, of eastern Oregon. This is the most severe outbreak of I. oregoni that has occurred in the Northwest since 1931, when there was a similar infestation in the vicinity of Klamath Falls, Oreg.

There has been a marked increase in the numbers of ponderosa pine infested by Ips oregoni Lec., and Ips ponderosae in the Black Hills of South Dakota. In many places they are killing trees in groups of ten or more. An epidemic by Ips engraver beetles and the southern pine beetle on 6,000 acres of privately owned lands in southeastern Jasper County, Tex., killed 24 million board feet of mature loblolly pine, of which 16 million board feet were salvaged. Smaller infestations of pine timber by Ips engraver beetles occurred in northern Florida, southern Louisiana, the Gulf coast of Mississippi, and in southern Arkansas.

BLACK HILLS BEETLE

The infestations of the Black Hills beetle in ponderosa pine in the central Rocky Mountain region have in general declined appreciably during the last season, owing to extensive control work and to apparently natural factors. In Utah there is still a serious infestation in ponderosa pine on the Powell National Forest, where it is estimated about 12,000 trees will be treated this winter. On the Wasatch National Forest a serious infestation was found to be developing in lodgepole pine.

THE SOUTHERN PINE BEETLE

Dendroctonus frontalis Zimm., which was seriously damaging pine timbers in the Coastal Plain of Virginia and North Carolina in 1938, subsided there to endemic numbers. However, in the mountains of North Carolina and Tennessee and in portions of the Piedmont of the Carolinas, this bark beetle was very destructive, killing large areas of shortleaf and pitch pines, especially in the Pisgah National Forest and in the Great Smoky Mountains National Park.

THE SMALLER EUROPEAN ELM BARK BEETLE

A map showing the known distribution of the smaller European elm bark beetle (Scolytus multistriatus Marsh.) in the United States at the end of 1937 was included in the Insect Pest Survey Bulletin, Summary for 1937. Additional distribution records were given in the Bulletin Summary for 1938. Certain records made by Government and State workers during 1939 are of interest because they add information to the known distribution of the beetle in this country. The finding of

the insect in and around Rochester, N. Y., is of most interest, as this area is so far removed from territory previously known to be infested. Other interesting records have to do with Columbus, Ohio, Sag Harbor, Long Island, N. Y., and Concord, N. H. S. multistriatus has also been taken during the year at several places in Connecticut, which extends the known infested area in that State somewhat farther east along Island Sound. The number of S. multistriatus adults collected from elm trap trees at six New Jersey locations in 1939 was less than the number collected at the same locations in 1938 under similar collecting methods.

SPRUCE BUDWORM

Outbreaks of the spruce budworm in the Douglas fir and white fir stands in central and southern Colorado are spreading to new areas and in many of the old areas the defoliation has become so severe that many trees will be killed. Infestations in ponderosa pine have been found in new areas but in the older outbreak areas the defoliation does not appear to be as severe as the previous year.

PANDORA MOTH

The epidemic of the pandora moth (Coloradia pandora Blake) in lodgepole pine on the Arapaho National Forest, in Colorado, was greatly reduced during the last year by three natural factors. An unusually cold winter killed many of the second-instar larvae that overwinter on the branches. A wilt disease of the larvae was effective in reducing the survivors of the winter. Abnormally high temperatures and dry, hard soil killed many of the mature larvae while they were attempting to enter the soil to pupate in July.

HEMLOCK LOOPER

The severe epidemic of the hemlock looper (Ellopia fiscellaria Guen.), which in 1937 appeared throughout the Alpine fir stands of northern Idaho and western Montana, was reduced through natural agencies to a normal condition in 1939. A number of parasites played a part in this reduction of which Phrynoldella n. sp. was most important. Although the first known record of this insect within the northern Rockies, the presence of its natural enemies indicates that it is indigenous to the region.

DOUGLAS FIR TUSSOCK MOTH

As predicted last year, infestation of the Douglas fir tussock moth (Hemerocampa pseudotsugata McD.) increased materially. In the infestation centering about Rudio Mountain of the Malheur National Forest many Douglas firs and true firs were completely defoliated and are expected to die. Understory ponderosa pine was also defoliated where infestation was heaviest. In this area a remarkable drop in population occurred during the late larval stages, which will probably result in a light infestation in 1940. An extensive new outbreak of this defoliator was discovered near Spray, Oreg., on the Umatilla National Forest. There, only partial defoliation was observed but probably there will be an increase next season.

GREAT BASIN TENT CATERPILLAR

An outbreak of the great basin tent caterpillar (Malacosoma fragilis Stretch) became widespread on the Deschutes National Forest, Oreg., where it caused severe defoliation of bitterbrush (Purshia tridentata), the most important native browse plant of the western ranges. This infestation was first observed in 1937 and de-

veloped rapidly during 1938 and 1939 to the point where control measures seem impractical. The last previous epidemic in this area occurred during the period 1928-30.

SCREWWORM

Losses from the screwworm in the Southwest during 1939 were about average and were somewhat less than in 1938. Less damage was noted, particularly in Arizona, New Mexico, Oklahoma, and Kansas and also in central and eastern Texas. Louisiana had little trouble with the pest and apparently Mississippi was not invaded at all. In Kansas there was considerable trouble early in the spring, owing to infested cattle being shipped into the State from southern Texas, but after June 1 the infestation practically disappeared. In the vicinity of Menard, Tex., a close check on several ranches indicated an infestation of 3.57 percent of all livestock in 1939 as compared with 3.27 percent in 1938.

The overwintering of the screwworm fly in numbers in Texas during the winter of 1938-39 was restricted mostly to a small area in Kinney and Val Verde and the southern part of Edwards Counties by very dry conditions during the latter part of the summer of 1938, and continuing through the winter and spring of 1939. A winter peak population of flies (153 females), as determined by trapping, was recorded at Brackettville, Tex., in December 1938. On the escarpment of the Edwards Plateau in Texas comparative populations of screwworm flies for the period January 1 to April 15 in 1938 and 1939 were 248 and 39, respectively. The spring population in 1939 reached a peak of 1,044 females in the trapping period, which ended June 30 at Brackettville. Migration is indicated to have reinfested the area east on the escarpment about 1 month later than normal and a light infestatio reached Lufkin, Tex., in the last days of August. Migration north into the Oklahoma area was only slightly slower than normal. The flies reached Buffalo, Okla., late in August, but none of the area south to the Balcones escarpment was heavily infested, there being practically no cases in much of the area during the entire summer.

The very hot, dry summer of 1938 practically exterminated the fly south and east of Uvalde, Tex., on the Gulf Coast Plain to near the Gulf coast. This area may have been reinfested during 1939 partly from the overwintering area at Brackettville and partly from the overwintering area about San Perlita, Tex., on the lower Gulf Coast Plain. None of this area had any considerable spring peak. The highest peak of 196 females was reached on April 15 at San Perlita. In the general area between San Perlita and Brackettville areas no place is indicated to have had more than 50 adults per trap period during the summer or fall. A high fall peak was built up along the escarpment. This peak was reached with 1,356 females per trapping period north of Brackettville on October 15, and for the eastern escarpment at Kerrville on the same date with 697 females. The peak population on the lower Gulf Plain was 70 females at San Perlita on October 30, the number decreasing to 35 on December 1. Other areas had less than 10 flies per trap period.

The decrease on the escarpment has been slightly greater this fall than last--from 4,077 adults to 134 in the general trapping area from October 1 to December 1--practically 97 percent. Last year the decrease was from a peak of 1,736 females to 65, or 96 percent, for the same period. At the first of December, 1939, there was a general infestation of about normal over the entire lower escarpment and a general light infestation over the entire Gulf Plain. Numerous screwworm infestations occurred among new-born calves during the latter half of December in the Brady, Tex., area.

In the Southeast, weather conditions were favorable during the fall and winter of 1938 for the screwworm to build up and overwinter in Florida and southern Georgia. Reports of screwworm cases during the winter months were received from Cook, Ben Hill, Bacon, Lowndes, and Ware Counties in Georgia, and winter cases were more or less general over Florida, except in the extreme western part. The pest began spreading northward and westward early in the spring. In Tift County, Ga., cases were reported the first week in April and in Clinch and Brooks Counties heavy infestations were reported in April and May. Later in the summer practically the entire State was infested and many cases occurred in South Carolina, particularly in the coastal region. In the upper Coastal Plains and in the Piedmont section the pest was less abundant than during previous years when it was present in the State. Alabama was also very generally infested and considerable loss was sustained especially in the southeastern third of the State. No cases were reported from North Carolina or Tennessee.

All are agreed that the screwworm was more abundant and destructive in Florida, Georgia, and the lower Coastal Plains of South Carolina than during the three preceding years. Many stock owners compared the infestation to the extreme one which existed in 1934 and 1935. A number of complaints were received from Florida, Georgia, and South Carolina of depredations of the screwworm on wildlife, particularly deer. (F. C. Bishopp, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

AMERICAN DOG TICK

In general, the American dog tick (Dermacentor variabilis Say) appeared to be about normal in abundance in the Eastern States during 1939. In some areas it was reported to be much less numerous than during the previous year, but in others it was clearly more abundant. On Cape Cod and on Martha's Vineyard, Mass., the adults of this tick were from two to five times as numerous at the peak of the season in May and June 1939 as in 1938, although activity of adult ticks ceased somewhat earlier in 1939 than in 1938.

Rocky Mountain spotted fever, which is transmitted by this tick in the central and eastern parts of the country, showed a distinct increase, according to reports published by the United States Public Health Service in Public Health Reports. The number of cases for the entire season of 1938 in the States where this tick is the dominant carrier was 242, as compared with 347 in 1939, up to the week ended December 7. The increase in the number of reported cases in New York (2 in 1938 to 10 in 1939), Pennsylvania (2 to 15), and Maryland (42 to 68) is particularly striking. The number of cases reported in the Western States, where the principal carrier is D. andersoni Stiles, also showed an increase, from 118 in 1938 to 169 in 1939. Few data regarding the relative abundance of this tick are at hand. (F. C. Bishopp, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

NOTES ON SUGARCANE PESTS IN HAWAII FOR THE YEAR 1939

by O. H. Swezey

Anomala orientalis Th. has been comparatively uncommon throughout the year. Nowhere have the grubs been in sufficient quantity to cause any damage in canefields. There has not been any extension of the infested area in cane lands, but the light infestation previously noted in pineapple lands adjacent to the upper canefields of one plantation has increased somewhat, and was recently reported as doing serious damage to some of the ratoon pineapple plants. As in recent years, the introduced parasites have been the chief factors in control of the pest in canefields.

Damage by Rhabdocnemis obscura Boisd. has been notedly on the decline of late. This may be ascribed to better control of rats (canes eaten into by rats being a favorite situation for the multiplication of the borer), the increased use of varieties of cane having a harder rind, and much elimination of holdover crops resulting from quota restrictions. At the same time the introduced New Guinea tachinid fly, Ceromasia sphenophori Vill., has continued its valuable assistance in checking the pest.

Perkinsiella saccharicida Kirk. has been rare throughout most of the Hawaii cane lands in 1939, owing to control by its numerous introduced natural enemies, most important of which is the egg-sucking bug Cyrtorhinus mundulus Bredd.

The sugarcane leafroller (Omiodes accepta Butl.), which had become of slight importance in the last several years, again came into prominence in 1939, though no measurable losses are reported. The few plantations noticeably affected were situated at lower elevations and in drier situations than where the former severe infestations occurred. It is possible that some of the newer seedling varieties being used are more susceptible to attack, or perhaps methods of culture may have resulted in the cane being more attractive to the pest. As usual, parasites have been active in checking the pest, the chief one being the braconid Microbracon omiodivorum Terry.

The nutgrass armyworm (Laphygma exempta Walk.) became epidemic on all the islands and on many of the plantations early in 1939, and considerable damage was done to fields of young cane. The unusual epidemics in some cases were found to be correlated to presence of grass areas adjacent to canefields, or to insufficien control of grass in the fields. The infestations soon came to an end at which tim the natural enemies were found to have increased to an abundance. Considerable attention was given to the artificial spreading of the egg parasite Telenomus nawaii Ashm. This parasite has become increasingly important in recent years.

The Chinese grasshopper (Oxya chinensis Thun.) has continued to be scarce, with no field outbreaks, undoubtedly owing to the presence of the introduced Malayan egg parasite Scelio pemberton Timb.

The black widow spider (Latrodectus mactans F.) continues to be a menace in several of the sugarcane areas, as well as in other situations. At times the mud dauber wasps store up considerable numbers of them in their nests. An egg parasite, Baeus californicus Pierce, was introduced from California in August and reared by the thousands for distribution, in the hopes of its becoming established and serving as a check to the spider.